REMARKS/ARGUMENTS

Claims 12-17 and 24-29 are pending in this application. By this Amendment, Applicant AMENDS the title of the invention, the specification, and claims 12 and 16, CANCELS claims 18-23, and ADDS claims 24-29.

Applicant affirms election of claims 12-17. Further, Applicant reserves the right to file a Divisional Application to pursue non-elected claims 18-23.

On page 4 of the Office Action, the Examiner objected to the drawings for failing to comply with 37 CFR § 1.84(p)(5) because reference character **22** shown in **Fig. 5** is not mentioned in the specification. Applicant has amended paragraph [0046] to discuss reference character **22**. Accordingly, Applicant respectfully requests reconsideration and withdrawal of this objection to the drawings.

The Examiner objected to the title of the invention for allegedly not being descriptive. Applicant has amended the title of the invention as suggested by the Examiner. Accordingly, Applicant respectfully requests reconsideration and withdrawal of this objection to the title of the invention.

The Examiner objected to claim 1 for allegedly containing a minor informality. Applicant has amended claim 1 to correct the minor informality as suggested by the Examiner. Accordingly, Applicant respectfully requests reconsideration and withdrawal of this objection to claim 1.

On page 5 of the outstanding Office Action, the Examiner rejected claims 12-14 under 35 U.S.C. § 102(b) as being anticipated by Hasegawa et al. (JP 2003-145290 A). On page 8 of the outstanding Office Action, the Examiner rejected claims 12-15 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al. On page 11 of the outstanding Office Action, the Examiner rejected claims 16 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al. in view of Ishio et al. (EP 1 068 924).

Applicant respectfully traverses the rejections of claims 12-17.

Applicant's claim 12 recites:

> A brazing method for brazing a first member and a second member to be joined via a braze joint, the method comprising the steps of:
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> preparing the first member and the brazing material foil, the first member including a base plate composed of a ferrous material and a diffusion suppressing layer laminated on the base plate for suppressing diffusion of Fe atoms into the braze joint from the base plate during the brazing, the diffusion suppressing layer being composed of a Ni-Cr alloy essentially comprising not less than about 15 mass% and not greater than about 40 mass% of Cr, **the brazing material foil being composed of a Cu-Ni alloy essentially comprising not less than about 10 mass% and not greater than about 20 mass% of Ni**;
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> assembling the first and second members into a temporary assembly with the brazing material foil disposed between the diffusion suppressing layer of the first member and the second member;
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> performing a brazing process by maintaining the temporary assembly at a brazing temperature of not less than about 1,200°C to fuse the brazing material and **diffuse Ni atoms and Cr atoms into the fused brazing material foil from the diffusion suppressing layer to form the braze joint, causing the resulting brazing material of the braze joint to have a higher melting point than the brazing temperature to self-solidify all of the brazing material of the braze joint**, wherein **the braze joint is free from segregated solidification and is composed of a Cu-Ni-Cr alloy comprising not less than about 34 mass% of Ni and not less than about 10 mass% of Cr**; and
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> cooling the resulting assembly. (emphasis added)

Applicant's claim 24 recites features and method steps that are similar to the above-emphasized features and method steps recited in Applicant's claim 12.

In Section Nos. 11 and 13 on pages 5-7 and 8-10 of the outstanding Office Action, the Examiner alleged that Hasegawa et al. teaches the features and method steps recited in Applicant's claim 12. The Examiner alleged that the ranges of Cr in the atom diffusion layer **12**, the ranges of Ni in the wax material section **13**, and the range of temperatures shown in Table 1, as discussed, for example, in paragraphs [0013], [0019], and [0024] and as shown in Table 1 of Hasegawa et al., correspond to the diffusion suppression layer, the brazing material, and the temperature of the brazing process, respectively, as recited in Applicant's claim 12.

Applicant has amended claim 12 to recite the feature of "the braze joint is free from segregated solidification and is composed of a Cu-Ni-Cr alloy comprising not less than about 34

mass% of Ni and not less than about 10 mass% of Cr." Applicant has added this feature to clarify the composition of the brazing material foil used before brazing from the composition of the braze joint formed after brazing from the brazing material foil. Support for this feature and the other amendments to claim 12 is found, for example, in **Figs. 3** and **4** of Applicant's drawings and in paragraph nos. [0031], [0032], [0039], [0040], and [0042] of Applicant's substitute specification.

Hasegawa et al. is discussed in paragraph [0007] of Applicant's substitute specification, which states:

> As described in JP-2003-145290-A [to Hasegawa et al.], the corrosion resistance of the braze joint is improved by the Fe atom diffusion suppressing layer composed of the Ni-Cr alloy containing Cr. However, if the Ni concentration of the alloy is higher than a certain level, the corrosion resistance is reduced to the contrary.

In contrast, the present invention achieves improved corrosion resistance. For example, paragraph [0010] of Applicant's substitute specification states, "With these actions, the braze joint [of the present invention] has excellent corrosion and oxidation resistances."

With respect to the brazing material foil including Ni, in the paragraph bridging pages 6 and 7 and the paragraph bridging pages 8 and 9 of the outstanding Office Action, the Examiner alleged that paragraph [0013] of Hasegawa et al. teaches the feature of "the brazing material foil being composed of a Cu-Ni alloy essentially comprising not less than about 10 mass% and not greater than about 20 mass% of Ni." However, this portion of Hasegawa et al. is directed to a braze joint formed **after** brazing, not the brazing material foil used **before** brazing as recited in Applicant's claim 11. Paragraph [0026] of Hasegawa et al. explains that the brazing material layer used before brazing is made of pure Cu or a Cu-Al alloy, without any Ni.

Thus, Hasegawa et al. fails to teach or suggest the feature of "the brazing material foil being composed of a Cu-Ni alloy essentially comprising not less than about 10 mass% and not greater than about 20 mass% of Ni" as recited in Applicant's claim 12.

With respect to the feature of causing the brazing material to self-solidify, Hasegawa et al. fails to teach or suggest that the brazing material self-solidifies. Hasegawa et al. fails to

discuss or to mention self-solidification. Further, the brazing material and the resulting braze joint of Hasegawa et al. will not self-solidify because of a lack of sufficient Ni.

Paragraphs [0009] and [0010] on pages 5 and 6 of the Applicant's substitute specification explains:

> The diffusion of the Ni atoms and the Cr atoms increases the melting point of the brazing alloy of the braze joint over the brazing temperature, whereby the braze joint is self-solidified at the brazing temperature. This phenomenon is referred to as "self-solidification". The self-solidified metal is free from dendrite and, hence, free from segregated solidification.
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> ... Therefore, the concentrations of Ni and Cr in the braze joint can be easily increased at a brazing temperature of not less than about 1200° C, whereby the braze joint is self-solidified. The corrosion resistance of the Cu alloy of the braze joint is improved by the action of Ni, and the surface of the braze joint is coated with a highly corrosion- and oxidation-resistant Cr oxide film formed by the action of Cr. With these actions, the braze joint has excellent corrosion and oxidation resistances.

The braze joint of Hasegawa et al. lacks sufficient Ni because the brazing material of Hasegawa et al. fails to include any Ni and because not enough Ni is diffused into the brazing material from the diffusion suppressing layer of Hasegawa et al.

Applicant has attached a liquidus projection for Cr-Cu-Ni ternary alloys. Sample no. 12 of Table 1 of Hasegawa et al., which the Examiner relied upon, is brazed at 1250 °C and is composed of 28 mass% of Ni, 18 mass% of Cr, and balance Cu. However, as seen in the attached liquidus projection for Cr-Cu-Ni ternary alloys, sample no. 12 of Hasegawa et al. at 1250 °C maintains the liquid phase and does not self solidify. The liquidus projection for Cr-Cu-Ni ternary alloys confirms the same for sample nos. 9 and 10.

Thus, Hasegawa et al. fails to teach or suggest the method step of "causing the resulting brazing material of the braze joint to have a higher melting point than the brazing temperature to self-solidify all of the brazing material of the braze joint" as recited in Applicant's claim 12.

With respect to the braze joint being free from segregated solidification, as explained in the above-quoted paragraph [0009] of Applicant's substitute specification, a self-solidified metal is free from dendrite and, hence, free from segregated solidification. Because the braze

joint of Hasegawa et al. is not formed by self-solidification, the braze joint of Hasegawa et al. is not free from segregated solidification.

Thus, Hasegawa et al. fails to teach or suggest the feature of "the braze joint is free from segregated solidification" as recited in Applicant's claim 12.

With respect to the braze joint having not less than about 34 mass% of Ni, sample nos. 9, 10, and 12 of Table 1 of Hasegawa et al., which the Examiner relied upon in page 6, line 6 of the outstanding Office Action, have no more than 28 mass% of Ni. Hasegawa et al. fails to teach or suggest that the braze joint is composed of a Cu-Ni-Cr alloy with not less than about 34 mass% of Ni. Sample nos. 9, 10, and 12 of Table 1 of Hasegawa et al. include Ni, but have no more than 28 mass% of Ni. Sample no. 12 has the highest mass% of Ni at 28. However, sample no. 12 has an unacceptable corrosion resistance, with an evaluation level of C. This unacceptable corrosion resistance of Hasegawa et al. that is caused by increased Ni is discussed in paragraph [0007] of Applicant's substitute specification, which states, "However, if the Ni concentration of the alloy is higher than a certain level, the corrosion resistance is reduced to the contrary." This is in contrast to the improved corrosion resistance of the present invention discussed in paragraph [0010] of Applicant's substitute specification, which states, "With these actions, the braze joint [of the present invention] has excellent corrosion and oxidation resistances."

Thus, Hasegawa et al. fails to teach or suggest the feature of "the braze joint ... is composed of a Cu-Ni-Cr alloy comprising not less than about 34 mass% of Ni" as recited in Applicant's claim 12.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 12 under 35 U.S.C. § 102(b) as being anticipated by Hasegawa et al. and the rejection of claim 12 under 35 U.S.C. § 103(a) as being unpatentable over Hasegawa et al.

The Examiner has relied upon Ishio et al. to allegedly cure various deficiencies in Hasegawa et al. However, Ishio et al. also fails to teach or suggest the features recited in Applicant's claim 12 discussed above that are not taught or suggested by Hasegawa et al.

Because Applicant's claim 24 recites features and method steps that are similar to the features and method steps recited in Applicant's claim 12 discussed above, Applicant respectfully submits that a prior art rejection of Applicant's claim 24 relying upon Hasegawa et al. and Ishio et al. would be improper.

Accordingly, Applicant respectfully submits that the prior art of record, applied alone or in combination, fails to teach or suggest the unique combination and arrangement of elements recited in claims 12 and 24 of the present application. Claims 13-17 and 25-29 depend upon claims 12 and 24 and are therefore allowable for at least the reasons that claims 12 and 24 are allowable.

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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